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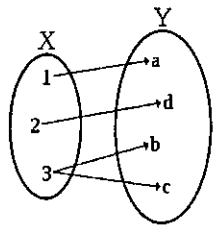
UNIT 2 REVIEW – FUNCTIONS

Idea 1 – Are the following functions?

1.



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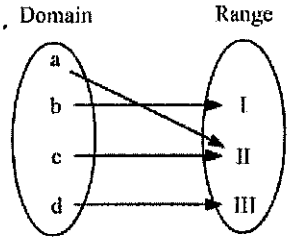

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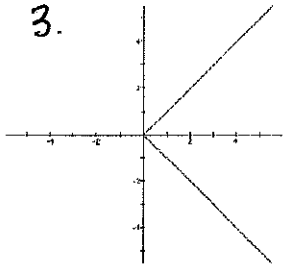

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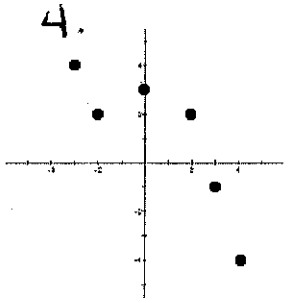

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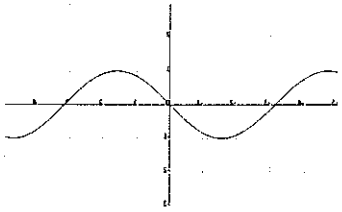

6.

x	y
-1	6
0	6
1	6
2	6

7.

x	y
-2	2
0	6
0	4
5	7

8. $f = \{(3,4),(-1,8),(3,7),(-5,8)\}$

9) Which ordered pair (x,y) makes the following relation a function? $\{(2,5),(-1,7),(5,3),(-2,6),(x,y)\}$

A. (2,9) B. (5,8) C. (4,7) D. (−1,10)

Idea 2 – Combine functions through the 4 operations.

$f(x) = 9x - 4$ $g(x) = 3x^2 - 5x + 7$ $h(x) = 8x$

1. Find $(f+h)(x)$. Remember that means $f(x)+h(x)$.

2. Find $(f-g)(x)$. Remember that means $f(x)-g(x)$.

3. Find $(h\cdot f)(x)$. Remember that means $h(x)\cdot f(x)$.

4. Find $\left(\frac{g}{f}\right)(x)$ Remember that means $\frac{g(x)}{f(x)}$.

5. Find $(h-f)(x)$.

6. Find $(h\cdot g)(x)$.

7. Find $(h+g)(x)$.

8. The revenue, R(x), from selling x units of a product is represented by the equation $R(x) = 20x$, while the total cost, C(x), of making x units of the product is represented by the equation $C(x) = 8x + 150$. The total profit, P(x), is represented by the equation $P(x) = R(x) - C(x)$.

For the values of R(x) and C(x) given above, what is P(x)?

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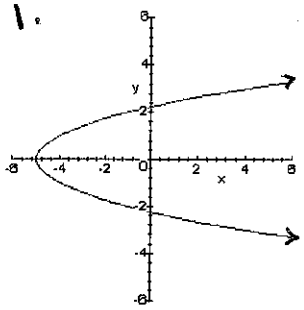
Idea 3 - Give the domain and range for each of the following functions or relations:

1.



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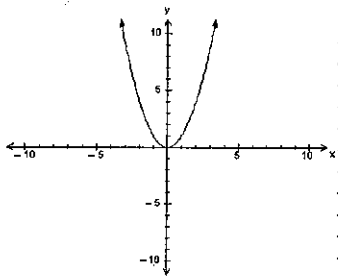

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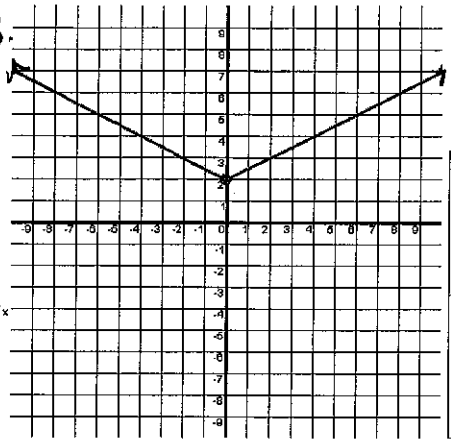

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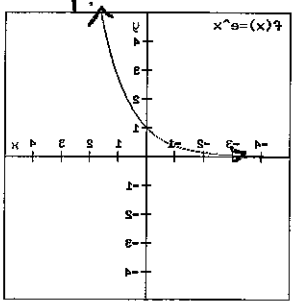

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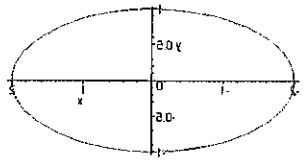


6) Give the interval notation for $x \leq 5$

7) $f = \{(3,4),(-1,8),(3,7),(-5,8)\}$

8. Which value of x is NOT in the domain of $y = \dfrac{6}{x+7}$?

Idea 4 –Evaluating Functions

$f(x) = 9x - 4$ $g(x) = 3x^2 - 5x + 7$ $h(x) = 8x$

1. Find $f(3)$

2. Find $g(-4)$

3. Find $h(5c)$

4. Find $g(d+4)$

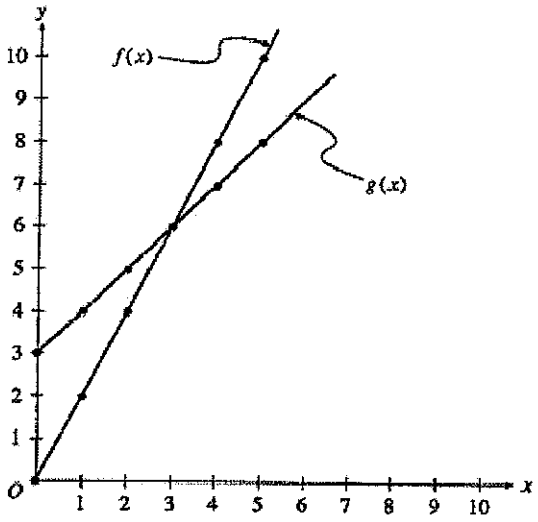
5. If $f(x) = \dfrac{x^2 - 3x + 6}{x - 1}$, find $f(-2)$

6. If $m(x) = x^{-\frac{1}{4}}$, then m(81) is equal to...

7. Which of the following functions will yield the largest value for x=20?

A. $f(x) = 3^x$ B. $f(x) = 3 + x$

C. $f(x) = 3x$ D. $f(x) = x^3$



Based on the graph to the right,

8. Find g(2) 9. Find f(4)

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Idea 5 – Composition of Functions

$f(x)=9x-4$ $g(x)=3x^2-5x+7$ $h(x)=8x$

1. Find $h \circ f$. Remember $h \circ f$ is also written as $h[f(x)]$.
2. Find $f \circ h$. Remember $f \circ h$ is also written as $f[h(x)]$.
3. Find $f[h(-4)]$.
4. Find $h[g(2)]$.
5. If $f(x)=2x^2+4$ and $g(x)=x-3$, which number satisfies $f(x)=(f \circ g)(x)$?

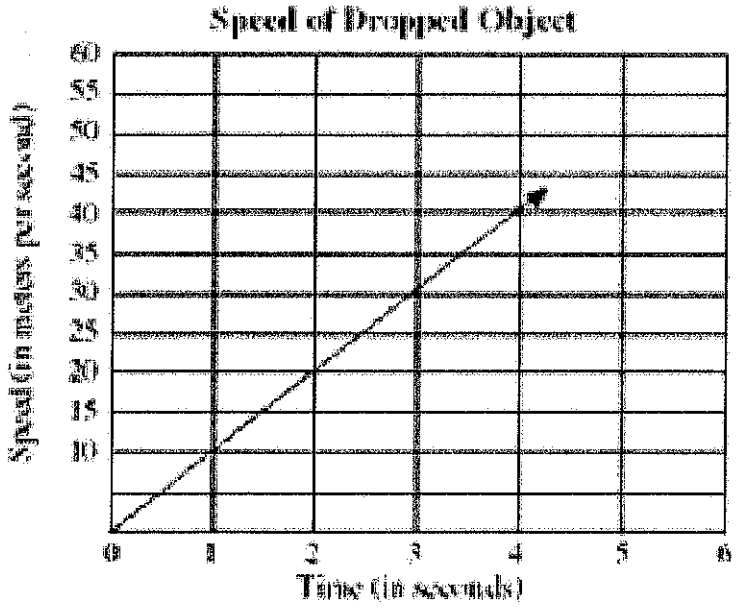
Idea 6 – Inverse Functions

Find the inverse of each function

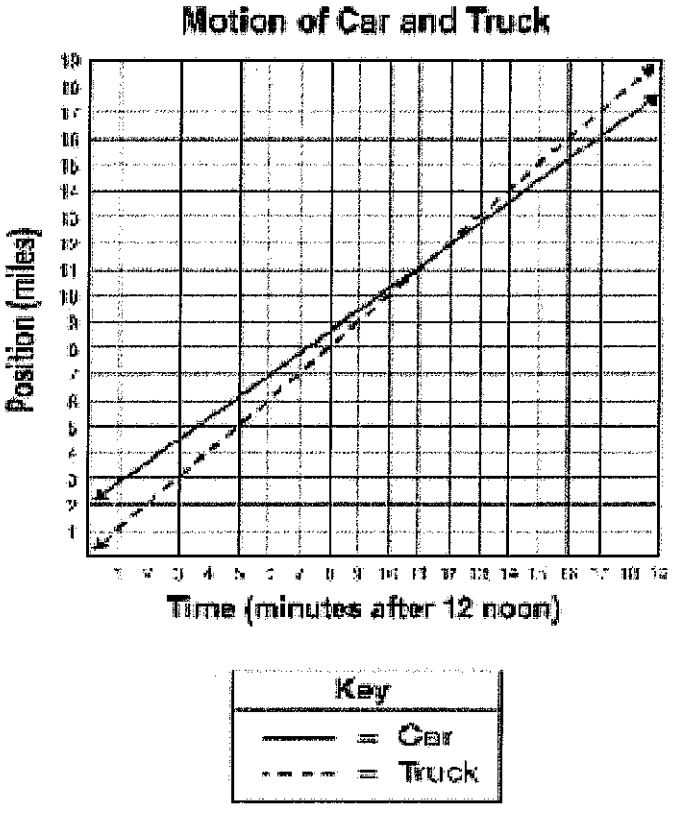
1. $l=\{(-4,2),(6,7),(5,-1)\}$
2. $f(x)=-2x+5$
3. $g(x)=-\frac{3}{4}x$
4. $h(x)=x-7$
5. $j(x)=\frac{x+9}{4}$
6. Graph the inverse of $f(x)=\{(0,4),(-3,4),(5,2)\}$

Idea 7 – Analyzing Graphs

1. Based on the graph, what will be the approximate speed of the dropped object after 6 seconds?



2. At what 2 times are the vehicles exactly 1 mile apart?



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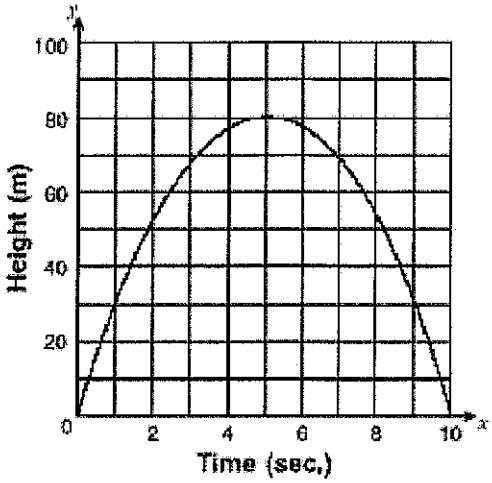
3. Based on the graph to the right, estimate the number of seconds for which the projectile was *at least 30 meters high.*



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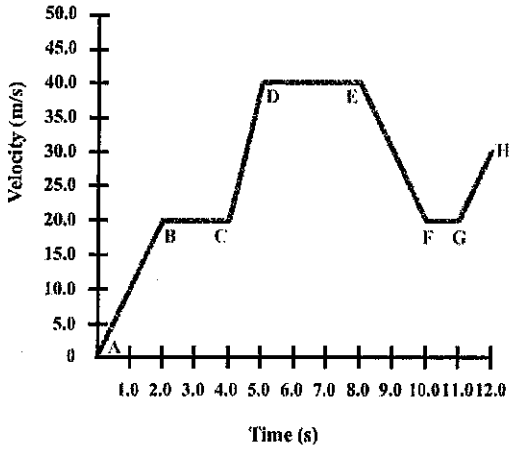


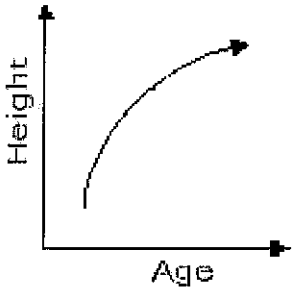
A. Name all the segments where the graph shows constant speed.
B. When is speed increasing?
C. When is speed decreasing?
D. When is the object moving the fastest?
E. When is the object stopped?

5. Draw a distance vs. time graph to show that I walked away from home at a steady pace for 5 minutes, then turned around and came home at a faster pace.

6. Draw a speed vs. time graph to show a biker who starts out slowly, goes at a constant pace for about 10 minutes, speeds up to a faster constant pace for 20 minutes, then slows to a stop.

7. Describe the rate of change of height vs. age graph shows

A. It grows at the same rate every year.
B. It grows fastest during its middle years.
C. It grows fastest during the first part of its life.
D. It grows fastest during its last years.



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Idea 8 – Match up the function families. (There is one capital letter and a double lower case letter for each family name).

1. Exponential
2. Cubic
3. Linear
4. Sine (Trigonometric)
5. Absolute value
6. Inverse
7. Logarithmic
8. Quadratic

A. $y = \sin x$

B. $f(x) = \ln x$

C. $f(x) = x^3$

D. $f(x) = |x|$

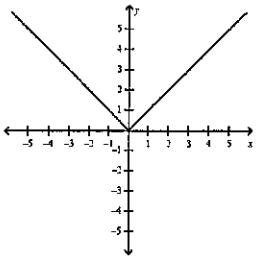
E. $f(x) = \dfrac{1}{x}$

F. $f(x) = e^x$

G. $f(x) = x$

H. $f(x) = x^2$

aa.



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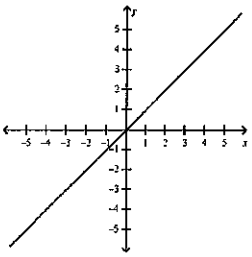

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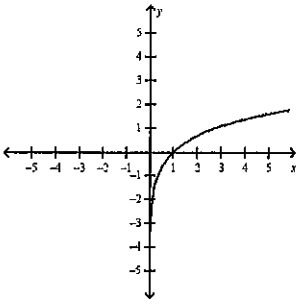

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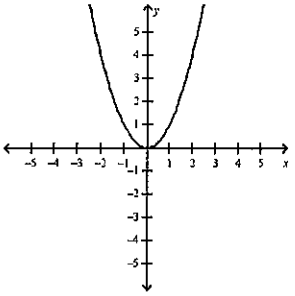
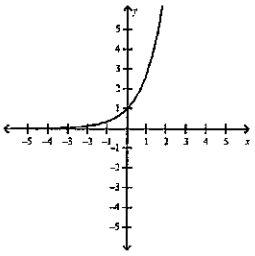


cc.



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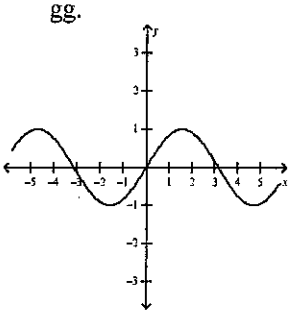

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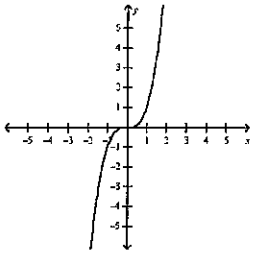

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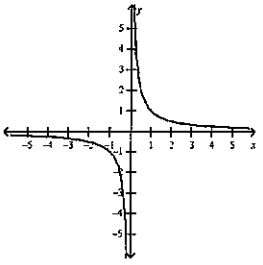

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SOLUTIONS

Answers 1 – Is it a function?

1) no 2) yes 3) no 4) yes 5) yes
6) yes 7) no 8) no 9) C

Answers 2 – Combining Functions Through the 4 Operations

1) $17x-4$ 2) $-3x^2+14x-11$ 3) $72x^2-32x$ 4) $\frac{3x^2-5x+7}{9x-4}$

5) $-x+4$ 6) $24x^3-40x^2+56x$ 7) $3x^2+3x+7$ 8) $P(x)=12x-150$

Answers 3 – Domain and Range of Functions

1) D: [-5,∞)
R: All real numbers

2) D: All real numbers
R: [0, ∞)

3) D: All real numbers
R: [2,∞)

4) D: All real numbers
R: (0, ∞)

5) D: [-2,2]
R: [-1,1]

6) $(-\infty,5]$

7) D: $\{-5,-1,3\}$
R: $\{4,7,8\}$

8) $x=-7$

Answers 4 – Evaluating Functions

1) 23 2) 75 3) 40c 4) $3d^2+19d+35$ 5) $-\frac{16}{3}=-5.\overline{3}$

6) $\frac{1}{3}$ 7) A 8) 5 9) 8

Answers 5 – Composition of Functions

1) $8(9x-4)=72x-32$ 2) $9(8x)-4=72x-4$ 3) $f[h(-4)]=f(-32)=-292$

4) $h[g(2)]=h(9)=72$ 5) $x=\frac{3}{2}$

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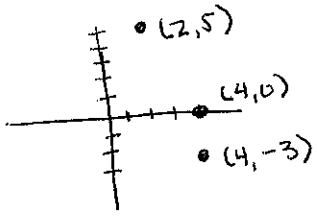
Answers 6 – Inverse functions

1) $l^{-1} = \{(2,-4),(7,6),(-1,5)\}$ 2) $f^{-1}(x) = \frac{x-5}{-2} = -\frac{1}{2}x + \frac{5}{2}$ 3) $g^{-1}(x) = -\frac{4}{3}x$

4) $h^{-1}(x) = x + 7$ 5) $j^{-1}(x) = 4x - 9$ 6)

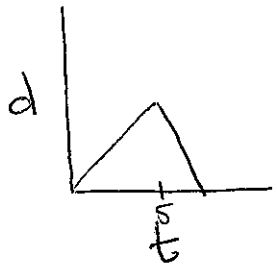


Answers 7 – Analyzing Graphs

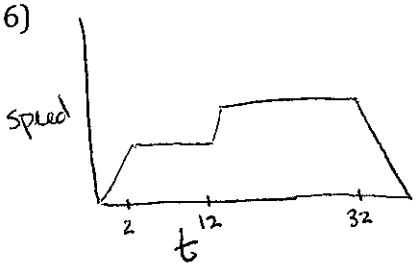
1) 60 meters per second 2) 12:06 and 12:18 3) 8 seconds

4) A. BC, DE, FG
B. AB, CD, GH
C. EF
D. DE (speed of 40 m/s)
E. Never

5)



6)



7) C

Answers 8 – Function Families

1) F, cc 2) C, dd 3) G, ee 4) A, gg 5) D, aa 6) E, hh
7) B, bb 8)H, ff